

## Site Specific Test Plan

Rocky Mountain Midstream, LLC  
Fort Lupton Plant  
4501 County Road 35  
Fort Lupton, CO 80621

Sources Tested: C-210, C-211, C-212 and C-213  
Proposed Test Dates: February 25-27, 2019

AST Project No. 2019-0281D

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Prepared By  
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### Regulatory Information

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|                      |  |
|----------------------|--|
| Permit No.           | 17WE0774   |
| AIRS ID              | 123 9F4C   |
| Regulatory Citations | 40 CFR 60, Subpart JJJJ<br>40 CFR 63, Subpart ZZZZ |

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### Source Information

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| Source Name | AIRS Point | Target Parameters  |
|-------------|------------|--------------------|
| C-210       | 007        | NOx, CO, VOC, HCHO |
| C-211       | 008        | NOx, CO, VOC, HCHO |
| C-212       | 009        | NOx, CO, VOC, HCHO |
| C-213       | 010        | NOx, CO, VOC, HCHO |

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### Contact Information

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*Test Location*  
Rocky Mountain Midstream LLC  
Fort Lupton Plant  
Section 21, T1N, R66W  
Fort Lupton, CO 80621

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## **1. Introduction**

Alliance Source Testing, LLC (AST) was retained by Rocky Mountain Midstream LLC (RMM) to conduct compliance testing at the Fort Lupton, Colorado compressor station (CS). Portions of the facility are subject to provisions of the Colorado Department of Public Health and Environment (CDPHE) Permit No. 17WE0774 and 410 CFR 60, Subpart JJJJ. Testing will be conducted to determine the emission rates of nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO) and formaldehyde (HCHO) from four (4) engines: C-210, C-211, C-212 and C-213.

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the CDPHE permit and 40 CFR 60, Subpart JJJJ.

## **2. Plant Description**

The Fort Lupton Plant is a natural gas compressor station located at Section 21, T1N, R66W.

## **3. Process Descriptions**

The Fort Lupton plant maintains three (3) 1875 hp, Caterpillar lean burn engines, model 3606 A4 and one (1) 1380 hp, Caterpillar lean burn engine, model G3516 J natural gas fired engines. All four engines employ an air to fuel ratio controller (O<sub>2</sub> sensor) and a catalytic oxidizer. Fuel consumption is measured by one of the following methods: individual engine fuel meter, facility-wide fuel meter attributed to fuel consumption rating and house of operation or manufacturer-provided fuel consumption rate.

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 3A, 10 and 320. Performance testing will be conducted when the unit is operating within 10% of peak load or at the highest achievable load. Each of the three (3) test runs will be approximately 60 minutes per run.

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

- Catalyst differential pressure
- Catalyst inlet temperature
- Catalyst installation date
- AFR mV set point
- AFR Type
- Engine load

Source Identification and permitted emission limits are summarized in Table 1.

**Table 1**  
**Emission Limits**

| Source                           | Pollutant | Limit   | Citation         |
|----------------------------------|-----------|---|------------------|
| C-210<br>C-211<br>C-212<br>C-213 | CO        | 47 ppmvd @ 15% O <sub>2</sub>                 | 63, Subpart ZZZZ |
|                                  |           | 93% DRE                                       |                  |
|                                  |           | 2.0 g/bhp-hr OR 160 ppmvd @15% O <sub>2</sub> | 60, Subpart JJJJ |
|                                  |           | 2.7 ton/yr                                    | Permit           |
|                                  | HCHO      | 14 ppmvd @ 15% O <sub>2</sub>                 | 63, Subpart ZZZZ |
| C-210, C-211 &<br>C-212          | NOx       | 1.0 g/bhp-hr OR 82 ppmvd @15% O <sub>2</sub>  | 60, Subpart JJJJ |
|                                  |           | 9.1 /ton/yr                                   | Permit           |
|                                  | VOC       | 0.7 g/bhp-hr OR 60 ppmvd @15% O <sub>2</sub>  | 40, Subpart JJJJ |
|                                  |           | 5.4 ton/yr                                    | Permit           |
| C-213                            | NOx       | 6.7 ton/yr                                    | Permit           |
| C-213                            | VOC       | 4.8 ton/yr                                    | Permit           |

#### 4. Permit and Regulations

The data collected during the test program will be used to determine the compliance status of the units with respect to applicable 40 CFR 60, Subpart JJJJ and CDPHE Permit No. 17WE0774. If the 40 CFR 63, Subpart ZZZZ HCHO emissions limit is not met then the inlet of each unit will be tested for CO to determine the destruction efficiency.

#### 5. Stack Schematic

The stack diameter, upstream and downstream disturbance distance and nipple lengths will be measure on site with a verification measurement provided by the Field Team Leader. Table 2 provides tentative source identification, stack dimensions and upstream/downstream disturbances.

**Table 2**  
**Sample Location Summary**

| Source Identification   | Diameter (inches) | Port Location to Nearest Disturbance – Upstream | Port Location to Nearest Disturbance - Downstream |
|-------------------------|-------------------|---|---|
| C-210<br>C-211<br>C-212 | 18"               | ≥ ½ Diameter                                    | ≥ 2 Diameters                                     |
| C-213                   | 12"               | ≥ ½ Diameter                                    | ≥ 2 Diameters                                     |

#### 6. Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3.

**Table 3**  
**Source Testing Methodology**

| Parameter  | U.S. EPA Reference Test Methods | Notes/Remarks              |
|--|---------------------------------|----------------------------|
| Volumetric Flow Rate   | 1-2                             | Full Velocity Traverse     |
| Oxygen / Carbon Dioxide  | 3A                              | Instrumental Analysis      |
| Carbon Monoxide  | 10                              | Instrumental Analysis      |
| Moisture, Nitrogen Oxides, Carbon Monoxide, Volatile Organic Compounds, Formaldehyde | 320                             | FTIR – Continuous Sampling |

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with a verification measurement provided by the Field Team Leader. The optional inlet testing will include reference methods 3A and 10.

#### **6.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate**

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

#### **6.2 U.S. EPA Reference Test Methods 3A and 10 – Oxygen/Carbon Dioxide and Carbon Monoxide**

The oxygen (O<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and carbon monoxide (CO) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A and 10. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line is used, then a portable non-contact condenser will be placed in the system directly after the probe. Otherwise, a heated Teflon sample line will be used. The quality control measures are described in Section 3.3.

#### **6.3 U.S. EPA Reference Test Method 320 – Gaseous Organic and Inorganic Compounds**

The concentrations of selected gaseous organic and inorganic compounds will be determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream will be extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured will be selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio will be measured and recorded to

document analyzer performance. A leak check will be performed on the sample cell. The instrument path length will be verified using ethylene as the Calibration Transfer Standard. Dynamic spiking will be performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.4.

#### **6.4 Quality Assurance/Quality Control – U.S. EPA Reference Test Methods 3A and 10**

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5 ppm (whichever was less restrictive) will be recorded. If the Low-Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5 ppm (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference or the data is invalidated, and the Calibration Error Test and System Bias must be repeated.

The Drift between pre- and post-run System Bias must be within 3% of the Calibration Span or 0.5 ppmv absolute difference or the Calibration Error Test and System Bias must be repeated.

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at twelve traverse points (as described in Method 1) or three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.5 ppm (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 1.0 ppm from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters

from the stack wall). If the pollutant concentration differs by more than 10% or 1.0 ppm from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a \*.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the AST server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at AST's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

#### **6.5 Quality Assurance/Quality Control – U.S. EPA Reference Method 320**

EPA Protocol 1 Calibration Gases – Cylinder calibration gases used will meet EPA Protocol 1 (+/- 2%) standards or will be certified standards.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) will be introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude will be recorded, a background spectrum will be taken, a linearity check will be performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest will be measured and a screenshot will be recorded.

Following the zero gas checks, room air will be pulled through the sample chamber and the line width and resolution will be verified to be at 1879 cm<sup>-1</sup>, the peak position will be entered and the FWHH will be recorded (screenshot). Following these checks, another background spectra will be recorded and the calibration transfer standard (CTS) will be introduced directly to the instrument sample port. The CTS instrument recovery will be recorded, and the instrument mechanical response time will be measured.

Next, stack gas will be introduced to the FTIR through the sampling system and several scans will be taken until a stable reading will be achieved. The native concentration of our surrogate spiking analyte (methanol) will be recorded. Spike gas will be introduced to the sampling system at a constant flow rate  $\leq 10\%$  of the total sample flow rate and a corresponding dilution ratio will be calculated along with a system response time. Matrix spike recovery spectra will be recorded and will be within the  $\pm 30\%$  of the calculated value of the spike concentration that the method requires.

The matrix spike recovery will be conducted once at the beginning of the testing and the CTS recovery procedures will be repeated following each test run. The corresponding values will be recorded.

**7. Quality Control / Quality Assurance Program**

AST follows the procedures outlined in the Quality Assurance/Quality Control (QA/QC) Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

**8. Equations**

See Appendix C - Equations

**9. Data Sheets**

See Appendix D – Data Sheets

**10. Safety Requirements**

Testing personnel will undergo site-specific safety training for all applicable areas up arrival at the site. AST personnel will have current OHSA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock-corded lanyards and full-body harnesses). AST personnel will comport themselves in a manner consistent with RMM and AST's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the AST Field Team Leader.

## 11. Test Schedule

Table 4 presents an outline and tentative schedule for the emissions testing program.

**Table 4**  
**Program Outline and Tentative Test Schedule**

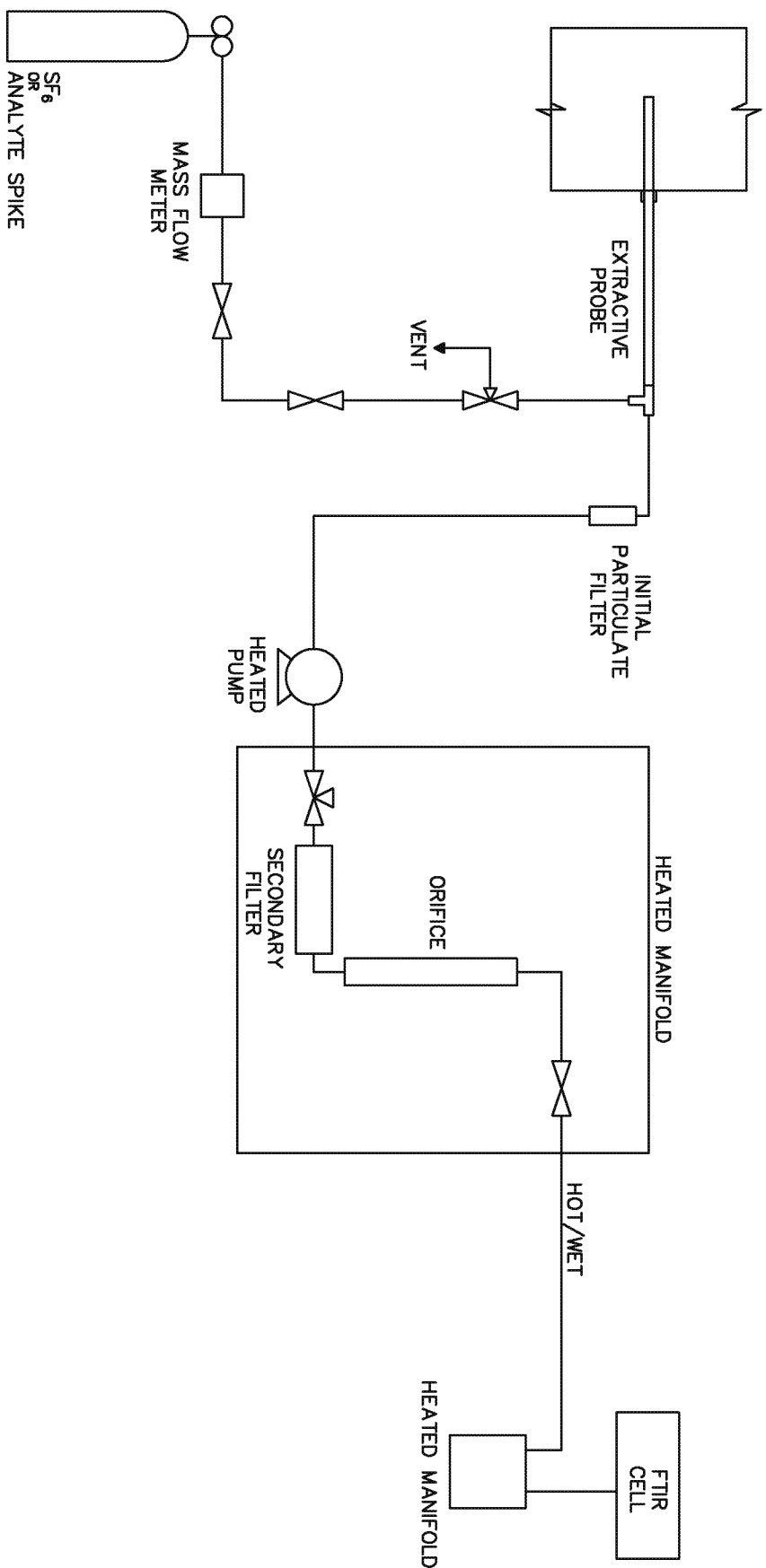
| Testing Location                       | Parameter                            | US EPA Method | No. of Runs | Run Duration | Est. Onsite Time |
|--|--------------------------------------|---------------|-------------|--------------|------------------|
| DAY 1 – February 25, 2019              |                                      |               |             |              |                  |
| Equipment Setup & Pretest QA/QC Checks |                                      |               |             |              | 4 hr             |
| DAY 2 – February 26, 2019              |                                      |               |             |              |                  |
| C-210                                  | VFR                                  | 1-2           | 3           | 60 / minutes | 12               |
|  | O <sub>2</sub> /CO <sub>2</sub>      | 3A            |             |              |                  |
|  | H <sub>2</sub> O, NOx, CO, VOC, HCHO | 320           |             |              |                  |
| C-211                                  | VFR                                  | 1-2           | 3           | 60 / minutes |                  |
|  | O <sub>2</sub> /CO <sub>2</sub>      | 3A            |             |              |                  |
|  | H <sub>2</sub> O, NOx, CO, VOC, HCHO | 320           |             |              |                  |
| DAY 3 – February 27, 2019              |                                      |               |             |              |                  |
| C-212                                  | VFR                                  | 1-2           | 3           | 60 / minutes | 12               |
|  | O <sub>2</sub> /CO <sub>2</sub>      | 3A            |             |              |                  |
|  | H <sub>2</sub> O, NOx, CO, VOC, HCHO | 320           |             |              |                  |
| C-213                                  | VFR                                  | 1-2           | 3           | 60 / minutes |                  |
|  | O <sub>2</sub> /CO <sub>2</sub>      | 3A            |             |              |                  |
|  | H <sub>2</sub> O, NOx, CO, VOC, HCHO | 320           |             |              |                  |
| DAY 4 – February 28, 2019              |                                      |               |             |              |                  |
| Contingency Day (if needed)            |                                      |               |             |              |                  |

## 12. Test Report

The final test report must be submitted within 30 days of the completion of the performance test and will include the following information.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Laboratory Data* – Copies of laboratory report(s) and chain of custody(s).
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by RMM) to support the test results.

## Appendix A

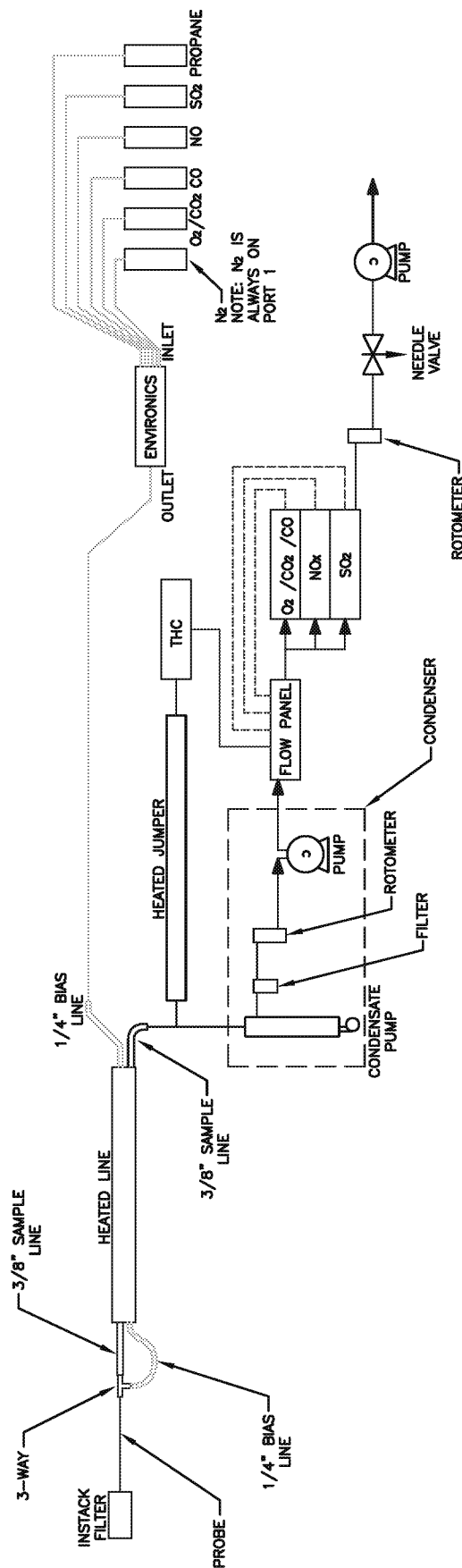


# EPA METHOD 320 FTIR SAMPLING/SPIKING SYSTEM

DRAWN BY: KWB JOB NO.: 2007-0308 REVISION: 1 SCALE: NTS

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**COLOR CODE**

- BLUE - STACK GAS
- GREEN- CALIBRATION GAS
- RED - INSTRUMENT SIGNAL OUTPUT (0-10V)

- NOTES: FLOW PANEL ROTOMETER CHANNEL**
- 1= NOX
  - 2= ANY INSTRUMENT
  - 3= ANY INSTRUMENT
  - 4= ANY INSTRUMENT
  - 5= ANY INSTRUMENT
  - 6= OUTLET (SHOULD ALWAYS BE OPEN)

## Appendix B



# CONSTRUCTION PERMIT

Permit number: 17WE0774 Issuance: 1

Date issued: December 27, 2017

Issued to: Discovery DJ Services, LLC

Facility Name: Fort Lupton Compressor Station  
Plant AIRS ID: 123 9F4C  
Physical Location: Section 21, T1N, R66W  
County: Weld County  
Description: Natural Gas Compressor Station

Equipment or activity subject to this permit:

| Facility Equipment ID | AIRS Point | Equipment Description  | Emissions Control Description  |
|-----------------------|------------|--|--|
| CB                    | 001        | Compressor Blowdowns   | None   |
| D-3101                | 003        | One triethylene glycol (TEG), natural gas dehydration unit (make, model, serial number: not submitted) with a design capacity of 20 MM scf per day. This emissions unit is equipped with two (make, model, not submitted) glycol pumps with a design capacity of 4.2 gallons per minute. This unit is equipped with a flash tank, reboiler and still vent. | Emissions from the still vent and flash tank are routed directly to the process flare. |
| D-3111                | 004        | One triethylene glycol (TEG), natural gas dehydration unit (make, model, serial number: not submitted) with a design capacity of 20 MM scf per day. This emissions unit is equipped with two (make, model, not submitted) glycol pumps with a design capacity of 4.2 gallons per minute. This unit is equipped with a flash tank, reboiler and still vent. | Emissions from the still vent and flash tank are routed directly to the process flare. |
| F-4101                | 006        | Process flare for TEG Dehydrators (Points 003 and 004) and slop tanks.   | NA   |
| C-210                 | 007        | One 1875 hp, Caterpillar lean burn engine, model 3606 A4, serial number to be determined.  | Air to fuel ratio controller (O2 sensor) and a catalytic oxidizer.                     |



|              |            |   |  |
|--------------|------------|---|--|
| <b>C-211</b> | <b>008</b> | One 1875 hp, Caterpillar lean burn engine, model 3606 A4, serial number to be determined. | Air to fuel ratio controller (O2 sensor) and a catalytic oxidizer. |
| <b>C-212</b> | <b>009</b> | One 1875 hp, Caterpillar lean burn engine, model 3606 A4, serial number to be determined. | Air to fuel ratio controller (O2 sensor) and a catalytic oxidizer. |
| <b>C-213</b> | <b>010</b> | One 1380 hp, Caterpillar lean burn engine, model G3516 J, serial number to be determined. | Air to fuel ratio controller (O2 sensor) and a catalytic oxidizer. |

**Point 007, 008, 009, 010:** This engine may be replaced with another engine in accordance with the temporary engine replacement provision or with another 1875 hp, Caterpillar engine, model 3606 A4 engine in accordance with the permanent replacement provision of the Alternate Operating Scenario (AOS), included in this permit as Attachment A.

**This permit is granted subject to all rules and regulations of the Colorado Air Quality Control Commission and the Colorado Air Pollution Prevention and Control Act (C.R.S. 25-7-101 et seq), to the specific general terms and conditions included in this document and the following specific terms and conditions.**

#### **REQUIREMENTS TO SELF-CERTIFY FOR FINAL AUTHORIZATION**

1. YOU MUST notify the Air Pollution Control Division (the Division) no later than fifteen days of the latter of commencement of operation or issuance of this permit, by submitting a Notice of Startup form to the Division for the equipment covered by this permit. The Notice of Startup form may be downloaded online at [www.colorado.gov/pacific/cdphe/other-air-permitting-notice](http://www.colorado.gov/pacific/cdphe/other-air-permitting-notice). Failure to notify the Division of startup of the permitted source is a violation of Air Quality Control Commission (AQCC) Regulation Number 3, Part B, Section III.G.1. and can result in the revocation of the permit.
2. Within one hundred and eighty days (180) of the latter of commencement of operation or issuance of this permit, compliance with the conditions contained in this permit shall be demonstrated to the Division. It is the owner or operator's responsibility to self-certify compliance with the conditions. Failure to demonstrate compliance within 180 days may result in revocation of the permit. A self certification form and guidance on how to self-certify compliance as required by this permit may be obtained online at [www.colorado.gov/pacific/cdphe/air-permit-self-certification](http://www.colorado.gov/pacific/cdphe/air-permit-self-certification). (Regulation Number 3, Part B, Section III.G.2.)
3. This permit shall expire if the owner or operator of the source for which this permit was issued: (i) does not commence construction/modification or operation of this source within 18 months after either, the date of issuance of this construction permit or the date on which such construction or activity was scheduled to commence as set forth in the permit application associated with this permit; (ii) discontinues construction for a period of eighteen months or more; (iii) does not complete construction within a reasonable time of the estimated completion date. The Division may grant extensions of the deadline. (Regulation Number 3, Part B, Section III.F.4.)
4. The operator shall complete all initial compliance testing and sampling as required in this permit and submit the results to the Division as part of the self-certification process. (Regulation Number 3, Part B, Section III.E.)
5. **Points 003 and 004:** The following information shall be provided to the Division within fifteen (15) days of the latter of commencement of operation or issuance of this permit.
  - The dehydrator manufacturer name, model number and serial number
  - The glycol circulation pump manufacturer name and model number

This information shall be included with the Notice of Startup submitted for the equipment. (Reference: Regulation Number 3, Part B, III.E.)

6. **Point 007, 008, 009, 010:** The following information shall be provided to the Division within fifteen (15) days of the latter of commencement of operation or issuance of this permit.

- manufacture date
- construction date
- order date
- date of relocation into Colorado
- manufacturer
- model number
- serial number

This information shall be included with the Notice of Startup submitted for the equipment. (Reference: Regulation No. 3, Part B, III.E.)

7. The operator shall retain the permit final authorization letter issued by the Division, after completion of self-certification, with the most current construction permit. This construction permit alone does not provide final authority for the operation of this source.

#### **EMISSION LIMITATIONS AND RECORDS**

8. Emissions of air pollutants shall not exceed the following limitations. (Regulation Number 3, Part B, Section II.A.4.)

##### **Monthly Limits:**

| Facility Equipment ID | AIRS Point | Tons per Month  |     |     | Emission Type |
|-----------------------|------------|-----------------|-----|-----|---------------|
|                       |            | NO <sub>x</sub> | VOC | CO  |               |
| D-3101                | 003        | --              | 0.5 | --  | Point         |
| D-3111                | 004        | --              | 0.5 | --  | Point         |
| C-210                 | 007        | 0.8             | 0.5 | 0.3 | Point         |
| C-211                 | 008        | 0.8             | 0.5 | 0.3 | Point         |
| C-212                 | 009        | 0.8             | 0.5 | 0.3 | Point         |
| C-213                 | 010        | 0.6             | 0.4 | 0.3 | Point         |

Note: Monthly limits are based on a 31-day month.

The owner or operator shall calculate monthly emissions based on the calendar month.

Facility-wide emissions of each individual hazardous air pollutant shall not exceed 1,359 pounds per month.

Facility-wide emissions of total hazardous air pollutants shall not exceed 3,398 pounds per month.

The facility-wide emissions limitation for hazardous air pollutants shall apply to all permitted emission units at this facility.

##### **Annual Limits:**

| Facility Equipment ID | AIRS Point | Tons per Year   |     |    | Emission Type |
|-----------------------|------------|-----------------|-----|----|---------------|
|                       |            | NO <sub>x</sub> | VOC | CO |               |

|               |            |            |            |             |              |
|---------------|------------|------------|------------|-------------|--------------|
| <b>CB</b>     | <b>001</b> | --         | <b>4.4</b> | --          | <b>Point</b> |
| <b>D-3101</b> | <b>003</b> | --         | <b>5.7</b> | --          | <b>Point</b> |
| <b>D-3111</b> | <b>004</b> | --         | <b>5.7</b> | --          | <b>Point</b> |
| <b>F-4101</b> | <b>006</b> | <b>5.4</b> | --         | <b>10.7</b> | <b>Point</b> |
| <b>C-210</b>  | <b>007</b> | <b>9.1</b> | <b>5.4</b> | <b>2.7</b>  | <b>Point</b> |
| <b>C-211</b>  | <b>008</b> | <b>9.1</b> | <b>5.4</b> | <b>2.7</b>  | <b>Point</b> |
| <b>C-212</b>  | <b>009</b> | <b>9.1</b> | <b>5.4</b> | <b>2.7</b>  | <b>Point</b> |
| <b>C-213</b>  | <b>010</b> | <b>6.7</b> | <b>4.8</b> | <b>2.7</b>  | <b>Point</b> |

Note: See "Notes to Permit Holder" for information on emission factors and methods used to calculate limits.

Facility-wide emissions of each individual hazardous air pollutant shall not exceed 8.0 tons per year.

Facility-wide emissions of total hazardous air pollutants shall not exceed 20.0 tons per year.

The facility-wide emissions limitation for hazardous air pollutants shall apply to all permitted emission units at this facility.

**Point 003, 004, 007, 008, 009, 010:** During the first twelve (12) months of operation, compliance with both the monthly and annual emission limitations is required. After the first twelve (12) months of operation, compliance with only the annual limitation is required.

Compliance with the annual limits, for criteria and hazardous air pollutants, shall be determined on a rolling twelve (12) month total. By the end of each month a new twelve month total is calculated based on the previous twelve months' data. The permit holder shall calculate actual emissions each month and keep a compliance record on site or at a local field office with site responsibility for Division review.

9. **Point 003 and 004:** Compliance with the emission limits in this permit shall be demonstrated by running the GRI GlyCalc model version 4.0 or higher on a monthly basis using the most recent extended wet gas analysis and recorded operational values, including: gas throughput, lean glycol recirculation rate, condenser temperature, flash tank temperature and pressure, wet gas inlet temperature, and wet gas inlet pressure. Recorded operational values, except for gas throughput, shall be averaged on a monthly basis for input into the model and be provided to the Division upon request.
10. The owner or operator shall operate and maintain the emission points in the table below with the emissions control equipment as listed in order to reduce emissions to less than or equal to the limits established in this permit. The owner or operator shall operate this dehydration unit so as to prevent any emissions directly to the atmosphere. (Regulation Number 3, Part B, Section III.E.)

| <b>Facility Equipment ID</b> | <b>AIRS Point</b> | <b>Control Device</b>            | <b>Pollutants Controlled</b> |
|------------------------------|-------------------|----------------------------------|------------------------------|
| <b>D-3101</b>                | <b>003</b>        | <b>Still Vent: Process Flare</b> | <b>VOC and HAP</b>           |
|                              |                   | <b>Flash Tank: Process Flare</b> | <b>VOC and HAP</b>           |

|        |     |  |             |
|--------|-----|--|-------------|
| D-3111 | 004 | Still Vent: Process Flare  | VOC and HAP |
|        |     | Flash Tank: Process Flare  | VOC and HAP |
| C-210  | 007 | Catalytic oxidizer and air to fuel ratio controller with O2 sensor | VOC and HAP |
| C-211  | 008 | Catalytic oxidizer and air to fuel ratio controller with O2 sensor | VOC and HAP |
| C-212  | 009 | Catalytic oxidizer and air to fuel ratio controller with O2 sensor | VOC and HAP |
| C-213  | 010 | Catalytic oxidizer and air to fuel ratio controller with O2 sensor | VOC and HAP |

### **PROCESS LIMITATIONS AND RECORDS**

11. This source shall be limited to the following maximum processing rates as listed below. Monthly records of the actual processing rates shall be maintained by the owner or operator and made available to the Division for inspection upon request. (Regulation Number 3, Part B, II.A.4.)

#### **Process Limits**

| Facility Equipment ID | AIRS Point | Process Parameter | Annual Limit     | Monthly Limit (31 days) |
|-----------------------|------------|-------------------|------------------|-------------------------|
| CB                    | 001        | Natural gas       | 0.403 MM scf/yr  | NA                      |
| D-3101                | 003        | Natural gas       | 7300 MM scf/yr   | 620 MM scf/month        |
| D-3111                | 004        | Natural gas       | 7300 MM scf/yr   | 620 MM scf/month        |
| F-4101                | 006        | Natural gas       | 51.5 MM scf/yr   | 4.38 MM scf/month       |
| C-210                 | 007        | Natural gas       | 109.02 MM scf/yr | 9.26 MM scf/month       |
| C-211                 | 008        | Natural gas       | 109.02 MM scf/yr | 9.26 MM scf/month       |
| C-212                 | 009        | Natural gas       | 109.02 MM scf/yr | 9.26 MM scf/month       |
| C-213                 | 010        | Natural gas       | 80.24 MM scf/yr  | 6.82 MM scf/month       |

**Point 003, 004:** The owner or operator shall monitor monthly process rates based on the calendar month. The volume of gas processed shall be measured by gas meter or by assuming the maximum design rate of the dehydrator unit of 20.0 MM scf/day.

During the first twelve (12) months of operation, compliance with both the monthly and annual throughput limitations is required. After the first twelve (12) months of operation, compliance with only the annual limitation is required.

**Point 007, 008, 009, 010:** Fuel consumption shall be measured by one of the following methods: individual engine fuel meter; facility-wide fuel meter attributed to fuel consumption rating and hours of operation; or manufacturer-provided fuel consumption rate.

**Point 001, 003, 004, 007, 008, 009, 010:** Compliance with the annual throughput limits shall be determined on a rolling twelve (12) month total. By the end of each month a new twelve-month total is calculated based on the previous twelve months' data. The permit holder shall calculate throughput each month and keep a compliance record on site or at a local field office with site responsibility, for Division review.

12. **Point 003, 004:** This unit shall be limited to the maximum lean glycol circulation rate of **4.2** gallons per minute. The lean glycol recirculation rate shall be recorded **weekly** in a log maintained on site and made available to the Division for inspection upon request. Glycol recirculation rate shall be monitored by one of the following methods: assuming maximum design pump rate, using glycol flow meter(s), or recording strokes per minute and converting to circulation rate. This maximum glycol circulation rate does not preclude compliance with the optimal glycol circulation rate ( $L_{opt}$ ) provisions under MACT HH. (Reference: Regulation Number 3, Part B, II.A.4)
13. **Point 003, 004:** On a weekly basis, the owner or operator shall monitor and record operational values including: flash tank temperature and pressure, wet gas inlet temperature and pressure. These records shall be maintained for a period of five years.

#### **STATE AND FEDERAL REGULATORY REQUIREMENTS**

14. **Point 001, 003, 004, 006, 007, 008, 009, 010:** The permit number and ten digit AIRS ID number assigned by the Division (e.g. 123/4567/001) shall be marked on the subject equipment for ease of identification. (Regulation Number 3, Part B, Section III.E.) (State only enforceable)
15. **Point 007, 008, 009, 010:** Visible emissions shall not exceed twenty percent (20%) opacity during normal operation of the source. During periods of startup, process modification, or adjustment of control equipment visible emissions shall not exceed 30% opacity for more than six minutes in any sixty consecutive minutes. Emission control devices subject to Regulation 7, Sections XII.C.1.d or XVII.B.2.b shall have no visible emissions. (Reference: Regulation No. 1, Section II.A.1. & 4.)
16. **Point 001, 003, 004, 006, 007, 008, 009, 010:** This source is subject to the odor requirements of Regulation Number 2. (State only enforceable)
17. **Point 003, 004:** This source is subject to Regulation Number 7, Section XII.H. The operator shall comply with all applicable requirements of Section XII and, specifically, shall:
  - Comply with the recordkeeping, monitoring, reporting and emission control requirements for glycol natural gas dehydrators; and
  - Ensure uncontrolled actual emissions of volatile organic compounds from the still vent and vent from any gas-condensate-glycol (GCG) separator (flash separator or flash tank), if present, shall be reduced by at least 90 percent on a rolling twelve-month basis through the use of a condenser or air pollution control equipment. (Regulation Number 7, Section XII.H.1.)
18. **Point 003, 004, 006:** The combustion device covered by this permit is subject to Regulation Number 7, Section XVII.B.2 General Provisions (State only enforceable). If a flare or other combustion device is used to control emissions of volatile organic compounds to comply with Section XVII, it shall be enclosed; have no visible emissions during normal operations, as defined under Regulation Number 7, XVII.A.16; and be designed so that an observer can, by means of visual observation from the outside of the enclosed flare or combustion device, or by other convenient means approved by the Division, determine whether it is operating properly. This flare must be equipped with an operational auto-igniter according to the following schedule:
  - All combustion devices installed on or after May 1, 2014, must be equipped with an operational auto-igniter upon installation of the combustion device;
  - All combustion devices installed before May 1, 2014, must be equipped with an operational auto-igniter by or before May 1, 2016, or after the next combustion device planned shutdown, whichever comes first.

19. The glycol dehydration unit covered by this permit is subject to the emission control requirements in Regulation Number 7, Section XVII.D.3. Beginning May 1, 2015, still vents and vents from any flash separator or flash tank on a glycol natural gas dehydrator located at an oil and gas exploration and production operation, natural gas compressor station, or gas-processing plant subject to control requirements pursuant to Section XVII.D.4., shall reduce uncontrolled actual emissions of hydrocarbons by at least 95% on a rolling twelve-month basis through the use of a condenser or air pollution control equipment.
20. The glycol dehydration unit at this facility is subject to National Emissions Standards for Hazardous Air Pollutants for Source Categories from Oil and Natural Gas Production Facilities, Subpart HH. This facility shall be subject to applicable area source provisions of this regulation, as stated in 40 C.F.R Part 63, Subpart A and HH. (Regulation Number 8, Part E, Subpart A and HH)

| MACT HH Applicable Requirements   | Area Source  |
|---|--|
|   | Benzene emissions exemption  |
| <b>§63.764 - General Standards</b>  | <p><b>§63.764 (e)(1)</b> - The owner or operator is exempt from the requirements of paragraph (d) of this section if the criteria listed in paragraph (e)(1)(i) or (ii) of this section are met, except that the records of the determination of these criteria must be maintained as required in §63.774(d)(1).</p> <p><b>§63.764 (e)(1)(ii)</b> – The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year, as determined by the procedures specified in §63.772(b)(2) of this subpart.</p>  |
| <b>§63.772 - Test Methods, Compliance Procedures and Compliance Demonstration</b> | <p><b>§63.772(b)</b> - Determination of glycol dehydration unit flowrate or benzene emissions. The procedures of this paragraph shall be used by an owner or operator to determine glycol dehydration unit natural gas flowrate or benzene emissions to meet the criteria for an exemption from control requirements under §63.764(e)(1).</p> <p><b>§63.772(b)(2)</b> - The determination of actual average benzene emissions from a glycol dehydration unit shall be made using the procedures of either paragraph (b)(2)(i) or (b)(2)(ii) of this section. Emissions shall be determined either uncontrolled, or with federally enforceable controls in place.</p> <p><b>§63.772(b)(2)(i)</b> – The owner or operator shall determine actual average benzene emissions using the model GRI-GLYCalc™, Version 3.0 or higher, and the procedures presented in the associated GRI-GLYCalc™ Technical Reference Manual. Inputs to the model shall be representative of actual operating conditions of the glycol dehydration unit and may be determined using the procedures documented in the Gas Research Institute (GRI) report entitled “Atmospheric Rich/Lean Method for Determining Glycol Dehydrator Emissions” (GRI-95/0368.1); or</p> <p><b>§63.772(b)(2)(ii)</b> - The owner or operator shall determine an average mass rate of benzene emissions in kilograms per hour through direct measurement using the methods in §63.772(a)(1)(i) or (ii), or an alternative method according to §63.7(f). Annual emissions in kilograms per year shall be determined by multiplying the mass rate by the number of hours the unit is operated per year. This result shall be converted to megagrams per year.</p> |
| <b>§63.774 - Recordkeeping Requirements</b>                                       | <p><b>§63.774 (d)(1)</b> - An owner or operator of a glycol dehydration unit that meets the exemption criteria in §63.764(e)(1)(i) or §63.764(e)(1)(ii) shall maintain the records specified in paragraph (d)(1)(i) or paragraph (d)(1)(ii) of this section, as appropriate, for that glycol dehydration unit.</p> <p><b>§63.774 (d)(1)(ii)</b> - The actual average benzene emissions (in terms of benzene emissions per year) as determined in accordance with §63.772(b)(2).</p>  |

21. **Point 007, 008, 009, 010:** This equipment is subject to the control requirements for stationary and portable engines in the 8-hour ozone control area under Regulation No. 7, Section XVI.B.2. For lean burn reciprocating internal combustion engines, an oxidation catalyst shall be required.
22. This source is subject to the requirements of:

- Regulation No. 8, Part E , Subpart III.FFFF: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE) of 40 C.F.R. Part 63, Subpart ZZZZ, and
- Regulation No. 8, Part E, Subpart I.A, National Emission Standards for Hazardous Air Pollutants for Source Categories: General Provisions, 40 CFR Part 63

including, but not limited to, the following:

- **Emission and Operating Limitations**

- **63.6600(b)** - If you own or operate a new or reconstructed 4SLB stationary RICE with a site rating of more than 500 brake HP located at major source of HAP emissions you must comply with the following emission limitations (Table 2a, Subpart ZZZZ to Part 63):
  - reduce CO emissions by 93 percent or more; or
  - limit concentration of formaldehyde in the stationary RICE exhaust to 14 ppmvd or less at 15 percent O<sub>2</sub>.
- **63.6600(b)** - If you own or operate a new or reconstructed 4SLB stationary RICE with a site rating of more than 500 brake HP located at major source of HAP emissions you must comply with the following operating limitations (Table 2b, Subpart ZZZZ to Part 63):
  - maintain your catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water at 100 percent load plus or minus 10 percent from the pressure drop across the catalyst that was measured during the initial performance test; and
  - maintain the temperature of your stationary RICE exhaust so that the catalyst inlet temperature is greater than or equal to 450 °F and less than or equal to 1350 °F.

- **General Compliance Requirements**

- **§63.6605(a)** - You must be in compliance with the emission limitations and operating limitations in this subpart that apply to you at all times, except during periods of startup, shutdown, and malfunction.
- **§63.6605(b)** - If you must comply with emission limitations and operating limitations, you must operate and maintain your stationary RICE, including air pollution control and monitoring equipment, in a manner consistent with good air pollution control practices for minimizing emissions at all times, including during startup, shutdown, and malfunction.

- **Testing and Initial Compliance Requirements**

- **§63.6610(a)** - You must conduct the initial performance test or other initial compliance demonstrations in Table 4 to Subpart ZZZZ of Part 63 that apply to you within 180 days after the compliance date that is specified for your stationary RICE in §63.6595 and according to the provisions in §63.7(a)(2).
- **§63.6615** - If you must comply with the emission limitations and operating limitations, you must conduct subsequent performance tests semiannually (as per Table 3 of Subpart ZZZZ to Part 63). After you have demonstrated compliance for two consecutive tests, you may reduce the frequency of subsequent performance tests to annually. If the results of any subsequent annual performance test indicate the stationary RICE is not in compliance with the CO or formaldehyde emission limitation, or you deviate from any of your operating limitations, you must resume semiannual performance tests.

- **§63.6625(a)** - If you elect to install a CEMS as specified in Table 5 of this subpart, you must install, operate, and maintain a CEMS to monitor CO and either oxygen or CO<sub>2</sub> at both the inlet and the outlet of the control device according to the requirements in paragraphs 63.6625(a)(1) through 63.6625(4) of Subpart ZZZZ to Part 63.
- **§63.6625(b)** - If you are required to install a continuous parameter monitoring system (CPMS) as specified in Table 5 of this subpart, you must install, operate, and maintain each CPMS according to the requirements in §63.8.
- **§63.6630(a)** - You must demonstrate initial compliance with each emission and operating limitation that applies to you according to Table 5 of Subpart ZZZZ to Part 63.
- **§63.6630(b)** - During the initial performance test, you must establish each operating limitation in Tables 1b and 2b of Subpart ZZZZ to Part 63 that applies to you.
- **§63.6630(c)** - You must submit the Notification of Compliance Status containing the results of the initial compliance demonstration according to the requirements in §63.6645.
- **Continuous Compliance Requirements** Delete this entire section if the engine is not one of the following:
  - **§63.6635(b)** - Except for monitor malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), you must monitor continuously at all times that the stationary RICE is operating.
  - **§63.6635(c)** - You may not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels. You must, however, use all the valid data collected during all other periods.
  - **§63.6640(a)** - You must demonstrate continuous compliance with each emission limitation and operating limitation in Tables 1a and 1b and Tables 2a and 2b of subpart ZZZZ of Part 63 that apply to you according to methods specified in Table 6 of Subpart ZZZZ of Part 63.
  - **§63.6640(b)** - You must report each instance in which you did not meet each emission limitation or operating limitation in Tables 1a and 1b and Tables 2a and 2b of Subpart ZZZZ of Part 63 that apply to you. These instances are deviations from the emission and operating limitations in this subpart. These deviations must be reported according to the requirements in §63.6650. If you change your catalyst, you must reestablish the values of the operating parameters measured during the initial performance test. When you reestablish the values of your operating parameters, you must also conduct a performance test to demonstrate that you are meeting the required emission limitation applicable to your stationary RICE.
  - **§63.6640(d)** - Consistent with §§63.6(e) and 63.7(e)(1), deviations from the emission or operating limitations that occur during a period of startup, shutdown, or malfunction are not violations if you demonstrate to the Administrator's satisfaction that you were operating in accordance with §63.6(e)(1). For new, reconstructed, and rebuilt stationary RICE, deviations from the emission or operating limitations that occur during the first 200 hours of operation from engine startup (engine burn-in period) are not violations.
  - **§63.6640(e)** - You must also report each instance in which you did not meet the requirements in Table 8 of Subpart ZZZZ to Part 63 that apply to you.
- **Notifications, Reports and Records**



- **§63.6645(a)** - If you own or operate a stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions you must submit all of the notifications in §§63.7(b) and (c), 63.8(e), (f)(4) and (f)(6), 63.9(b) through (e), and (g) and (h) that apply to you by the dates specified.
- **§63.6645(g)** - If you are required to conduct a performance test, you must submit a Notification of Intent to conduct a performance test at least 60 days before the performance test is scheduled to begin as required in §63.7(b)(1).
- **§63.6645(h)** - If you are required to conduct a performance test or other initial compliance demonstration as specified in Tables 4 and 5 of Subpart ZZZZ to Part 63, you must submit a Notification of Compliance Status according to §63.9(h)(2)(ii).
  - **§63.6645(h)(1)** - For each initial compliance demonstration required in Table 5 of Subpart ZZZZ to Part 63 that does not include a performance test, you must submit the Notification of Compliance Status before the close of business on the 30th day following the completion of the initial compliance demonstration
  - **§63.6645(h)(2)** - For each initial compliance demonstration required in Table 5 of Subpart ZZZZ to Part 63 that includes a performance test conducted according to the requirements in Table 3 to this subpart, you must submit the Notification of Compliance Status, including the performance test results, before the close of business on the 60th day following the completion of the performance test according to §63.10(d)(2).
- **§63.6650(a)** - You must submit each report in Table 7 of Subpart ZZZZ to Part 63 that applies to you.
- **§63.6655(a)** - If you must comply with the emission and operating limitations, you must keep the records described in §63.6655(a)(1) through (a)(3), §63.6655 (b)(1) through (b)(3) and §63.6655 (c).
- **§63.6655(d)** - You must keep the records required in Table 6 of Subpart ZZZZ of Part 63 to show continuous compliance with each emission or operating limitation that applies to you.
- **§63.6660(a)** - Your records must be in a form suitable and readily available for expeditious review according to §63.10(b)(1).
- **§63.6660(b)** - As specified in §63.10(b)(1), you must keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record.
- **§63.6660(c)** - You must keep each record readily accessible in hard copy or electronic form on-site for at least 2 years after the date of each occurrence, measurement, maintenance, corrective action, report, or record, according to §63.10(b)(1). You can keep the records off-site for the remaining 3 years.
- **Other Requirements and Information**
  - **§63.6665** - Table 8 to this subpart shows which parts of the General Provisions in §§63.1 through 63.15 apply to you.

23. **Points 007, 008, 009, 010:** These sources are subject to 40 CFR, Part 60, Subpart OOOOa—Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015 (See June 3, 2016 Federal Register posting – effective August 02, 2016). This rule has not yet been incorporated into Colorado Air Quality Control Commission's Regulation No. 6. A copy of the complete subpart is

available on the EPA website at: <https://www.gpo.gov/fdsys/pkg/FR-2016-06-03/pdf/2016-11971.pdf>

24. **Point 007, 008, 009, 010:** This equipment is subject to the control requirements for natural gas-fired reciprocating internal combustion engines under Regulation No. 7, Section XVII.E (State only enforceable). The owner or operator of any natural gas-fired reciprocating internal combustion engine that is either constructed or relocated to the state of Colorado from another state after the date listed in the table below shall operate and maintain each engine according to the manufacturer's written instructions or procedures to the extent practicable and consistent with technological limitations and good engineering and maintenance practices over the entire life of the engine so that it achieves the emission standards required in the table below:

| Maximum <sup>1</sup> Engine HP | Construction or Relocation Date | Emission Standard in g/hp-hr |     |     |
|--------------------------------|---------------------------------|------------------------------|-----|-----|
|                                |                                 | NOx                          | CO  | VOC |
| <100HP                         | Any                             | N/A                          | N/A | N/A |
| ≥100HP and <500HP              | January 1, 2008                 | 2.0                          | 4.0 | 1.0 |
|                                | January 1, 2011                 | 1.0                          | 2.0 | 0.7 |
| ≥500HP                         | July 1, 2007                    | 2.0                          | 4.0 | 1.0 |
|                                | July 1, 2010                    | 1.0                          | 2.0 | 0.7 |

#### **OPERATING & MAINTENANCE REQUIREMENTS**

25. **Point 003, 004:** Upon startup of these points, the owner or operator shall follow the most recent operating and maintenance (O&M) plan and record keeping format approved by the Division, in order to demonstrate compliance on an ongoing basis with the requirements of this permit. Revisions to the O&M plan are subject to Division approval prior to implementation. (Regulation Number 3, Part B, Section III.G.7.)
26. **Point 001:** This source is not required to follow a Division-approved operating and maintenance plan.

#### **COMPLIANCE TESTING AND SAMPLING**

##### **Initial Testing Requirements**

27. **Point 003, 004, 006:** The owner or operator shall demonstrate compliance with opacity standards, using EPA Reference Method 22, 40 C.F.R. Part 60, Appendix A, to determine the presence or absence of visible emissions. "Visible Emissions" means observations of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation. (Regulation Number 7, Sections XVII.B.2. and XVII.A.16)
28. **Point 003, 004:** The owner or operator shall complete the initial extended wet gas analysis within one hundred and eighty days (180) of the latter of commencement of operation or issuance of this permit. The owner or operator shall use this analysis to calculate actual emissions, as prescribed in the Emission Limitation and Records section of this permit, to verify initial compliance with the emission limits. The owner or operator shall submit the analysis and the emission calculation results to the Division as part of the self-certification process. (Reference: Regulation Number 3, Part B, Section III.E.)
29. **Point 007, 008, 009, 010:** A source initial compliance test shall be conducted on to measure the emission rate(s) for the pollutants listed below in order to demonstrate compliance with the emission limits in this permit. The test protocol must be in accordance with the requirements of the Air Pollution Control Division Compliance Test Manual and shall be submitted to the Division for review and approval at least thirty (30) days prior to testing. No compliance test shall be conducted without prior approval from the Division. Any compliance test conducted to show compliance with

a monthly or annual emission limitation shall have the results projected up to the monthly or annual averaging time by multiplying the test results by the allowable number of operating hours for that averaging time (Reference: Regulation No. 3, Part B., Section III.G.3)

Oxides of Nitrogen using EPA approved methods  
Carbon Monoxide using EPA approved methods  
Formaldehyde

#### **Periodic Testing Requirements**

30. **Point 003, 004:** The owner or operator shall demonstrate compliance with opacity standards, using EPA Reference Method 22, 40 C.F.R. Part 60, Appendix A, on a weekly basis to determine the presence or absence of visible emissions. "Visible Emissions" means observations of smoke for any period or periods of duration greater than or equal to one minute in any fifteen minute period during normal operation. (Regulation Number 7, Sections XVII.B.2. and XVII.A.16)
31. **Point 003, 004:** The owner or operator shall complete an extended wet gas analysis prior to the inlet of the dehydration unit on an annual basis. Results of the wet gas analysis shall be used to calculate emissions of criteria pollutants and hazardous air pollutants per this permit and be provided to the Division upon request.
32. **Point 007, 008, 009, 010:** This engine is subject to the periodic testing requirements of 40 C.F.R Part 63, Subpart ZZZZ.
33. **Point 007, 008, 009, 010:** This engine is subject to the periodic testing requirements as specified in the operating and maintenance (O&M) plan as approved by the Division. Revisions to your O&M plan are subject to Division approval. Replacements of this unit completed as Alternative Operating Scenarios may be subject to additional testing requirements as specified in Attachment A.

#### **ADDITIONAL REQUIREMENTS**

34. A revised Air Pollutant Emission Notice (APEN) shall be filed: (Regulation Number 3, Part A, II.C.)

- Annually by April 30<sup>th</sup> whenever a significant increase in emissions occurs as follows:

##### **For any criteria pollutant:**

For sources emitting **less than 100 tons per year**, a change in actual emissions of five (5) tons per year or more, above the level reported on the last APEN; or

For volatile organic compounds (VOC) and nitrogen oxides sources (NO<sub>x</sub>) in ozone nonattainment areas emitting **less than 100 tons of VOC or NO<sub>x</sub> per year**, a change in annual actual emissions of one (1) ton per year or more or five percent, whichever is greater, above the level reported on the last APEN; or

For sources emitting **100 tons per year or more**, a change in actual emissions of five percent or 50 tons per year or more, whichever is less, above the level reported on the last APEN submitted; or

##### **For any non-criteria reportable pollutant:**

If the emissions increase by 50% or five (5) tons per year, whichever is less, above the level reported on the last APEN submitted to the Division.

- Whenever there is a change in the owner or operator of any facility, process, or activity; or
- Whenever new control equipment is installed, or whenever a different type of control equipment replaces an existing type of control equipment; or
- Whenever a permit limitation must be modified; or
- No later than 30 days before the existing APEN expires.

## GENERAL TERMS AND CONDITIONS

35. This permit and any attachments must be retained and made available for inspection upon request. The permit may be reissued to a new owner by the APCD as provided in AQCC Regulation Number 3, Part B, Section II.B. upon a request for transfer of ownership and the submittal of a revised APEN and the required fee.
36. If this permit specifically states that final authorization has been granted, then the remainder of this condition is not applicable. Otherwise, the issuance of this construction permit does not provide "final" authority for this activity or operation of this source. Final authorization of the permit must be secured from the APCD in writing in accordance with the provisions of 25-7-114.5(12)(a) C.R.S. and AQCC Regulation Number 3, Part B, Section III.G. Final authorization cannot be granted until the operation or activity commences and has been verified by the APCD as conforming in all respects with the conditions of the permit. Once self-certification of all points has been reviewed and approved by the Division, it will provide written documentation of such final authorization. **Details for obtaining final authorization to operate are located in the Requirements to Self-Certify for Final Authorization section of this permit.**
37. This permit is issued in reliance upon the accuracy and completeness of information supplied by the owner or operator and is conditioned upon conduct of the activity, or construction, installation and operation of the source, in accordance with this information and with representations made by the owner or operator or owner or operator's agents. It is valid only for the equipment and operations or activity specifically identified on the permit.
38. Unless specifically stated otherwise, the general and specific conditions contained in this permit have been determined by the APCD to be necessary to assure compliance with the provisions of Section 25-7-114.5(7)(a), C.R.S.
39. Each and every condition of this permit is a material part hereof and is not severable. Any challenge to or appeal of a condition hereof shall constitute a rejection of the entire permit and upon such occurrence, this permit shall be deemed denied *ab initio*. This permit may be revoked at any time prior to self-certification and final authorization by the Air Pollution Control Division (APCD) on grounds set forth in the Colorado Air Quality Control Act and regulations of the Air Quality Control Commission (AQCC), including failure to meet any express term or condition of the permit. If the Division denies a permit, conditions imposed upon a permit are contested by the owner or operator, or the Division revokes a permit, the owner or operator of a source may request a hearing before the AQCC for review of the Division's action.
40. Section 25-7-114.7(2)(a), C.R.S. requires that all sources required to file an Air Pollution Emission Notice (APEN) must **pay an annual fee** to cover the costs of inspections and administration. If a source or activity is to be discontinued, the owner must notify the Division in writing requesting a cancellation of the permit. Upon notification, annual fee billing will terminate.
41. Violation of the terms of a permit or of the provisions of the Colorado Air Pollution Prevention and Control Act or the regulations of the AQCC may result in administrative, civil or criminal enforcement actions under Sections 25-7-115 (enforcement), -121 (injunctions), -122 (civil penalties), -122.1 (criminal penalties), C.R.S.

By:



Kirk Bear  
Permit Engineer

**Permit History**

| Issuance   | Date          | Description                          |
|------------|---------------|--------------------------------------|
| Issuance 1 | This Issuance | Issued to Discovery DJ Services, LLC |



Notes to Permit Holder at the time of this permit issuance:

- 1) The permit holder is required to pay fees for the processing time for this permit. An invoice for these fees will be issued after the permit is issued. The permit holder shall pay the invoice within 30 days of receipt of the invoice. Failure to pay the invoice will result in revocation of this permit. (Regulation Number 3, Part A, Section VI.B.)
- 2) The production or raw material processing limits and emission limits contained in this permit are based on the consumption rates requested in the permit application. These limits may be revised upon request of the owner or operator providing there is no exceedance of any specific emission control regulation or any ambient air quality standard. A revised air pollution emission notice (APEN) and complete application form must be submitted with a request for a permit revision.
- 3) This source is subject to the Common Provisions Regulation Part II, Subpart E, Affirmative Defense Provision for Excess Emissions During Malfunctions. The owner or operator shall notify the Division of any malfunction condition which causes a violation of any emission limit or limits stated in this permit as soon as possible, but no later than noon of the next working day, followed by written notice to the Division addressing all of the criteria set forth in Part II.E.1 of the Common Provisions Regulation. See: <https://www.colorado.gov/pacific/cdphe/aqcc-regs>
- 4) The following emissions of non-criteria reportable air pollutants are estimated based upon the process limits as indicated in this permit. This information is listed to inform the operator of the Division's analysis of the specific compounds emitted if the source(s) operate at the permitted limitations.

| Facility Equipment ID | AIRS Point | Pollutant    | CAS #   | Uncontrolled Emissions (lb/yr) | Controlled Emissions (lb/yr) |
|-----------------------|------------|--------------|---------|--------------------------------|------------------------------|
| CB                    | 001        | n-Hexane     | 110543  | 337                            | NA                           |
| D-3101                | 003        | Benzene      | 71432   | 21811                          | 1091                         |
|                       |            | Toluene      | 108883  | 24428                          | 1221                         |
|                       |            | Ethylbenzene | 100414  | 6023                           | 301                          |
|                       |            | Xylenes      | 1330207 | 11653                          | 583                          |
|                       |            | n-Hexane     | 110543  | 4096                           | 205                          |
|                       |            | 224 TMP      | 540841  | 2                              | 0                            |
| D-3111                | 004        | Benzene      | 71432   | 21811                          | 1091                         |
|                       |            | Toluene      | 108883  | 24428                          | 1221                         |
|                       |            | Ethylbenzene | 100414  | 6023                           | 301                          |
|                       |            | Xylenes      | 1330207 | 11653                          | 583                          |
|                       |            | n-Hexane     | 110543  | 4096                           | 205                          |
|                       |            | 224 TMP      | 540841  | 2                              | 0                            |
| C-210                 | 007        | Formaldehyde | 50000   | 7242                           | 724                          |
|                       |            | Acetaldehyde | 75070   | 1030                           | NA                           |
|                       |            | Acrolein     | 107028  | 633                            | NA                           |
|                       |            | Methanol     | 67561   | 308                            | NA                           |
| C-211                 | 008        | Formaldehyde | 50000   | 7242                           | 724                          |

|              |            |              |        |       |      |
|--------------|------------|--------------|--------|-------|------|
|              |            | Acetaldehyde | 75070  | 1030  | NA   |
|              |            | Acrolein     | 107028 | 633   | NA   |
|              |            | Methanol     | 67561  | 308   | NA   |
| <b>C-212</b> | <b>009</b> | Formaldehyde | 50000  | 7242  | 724  |
|              |            | Acetaldehyde | 75070  | 1030  | NA   |
|              |            | Acrolein     | 107028 | 633   | NA   |
|              |            | Methanol     | 67561  | 308   | NA   |
| <b>C-213</b> | <b>010</b> | Formaldehyde | 50000  | 11460 | 1146 |
|              |            | Acetaldehyde | 75070  | 835   | NA   |
|              |            | Acrolein     | 107028 | 513   | NA   |

Note: All non-criteria reportable pollutants in the table above with uncontrolled emission rates above 250 pounds per year (lb/yr) are reportable and may result in annual emission fees based on the most recent Air Pollution Emission Notice.

5) The emission levels contained in this permit are based on the following emission factors:

**Point 001:**

| CAS #  | Pollutant | Uncontrolled Emission Factors (lb/event) | Source       |
|--------|-----------|--|--------------|
|        | VOC       | 90.4                                     | Mass Balance |
| 110543 | n-Hexane  | 3.5                                      | Mass Balance |

**Point 003 and 004:** The emission levels contained in this permit are based on information provided in the application and the GRI GlyCalc 4.0 model. Controlled emissions are based on a flare control efficiency of 95 %.

| CAS #   | Pollutant    | Uncontrolled Emission Factors lb/MM scf | Source |
|---------|--------------|---|--------|
|         | VOC          | 31.04                                   | AP-42  |
| 71432   | Benzene      | 2.99                                    | AP-42  |
| 108883  | Toluene      | 3.35                                    | AP-42  |
| 100414  | Ethylbenzene | 0.83                                    | AP-42  |
| 1330207 | Xylenes      | 1.60                                    | AP-42  |
| 110543  | n-Hexane     | 0.56                                    | AP-42  |

Note: The combustion emission factors are based on a heating value of 1500 Btu/scf

**Point 006:**

| CAS #  | Pollutant | Uncontrolled Emission Factors lb/MM Btu | Source |
|--------|-----------|---|--------|
| 71432  | NOx       | 0.138                                   | TCEQ   |
| 108883 | CO        | 0.276                                   | TCEQ   |

**Point 007, 008, 009:**

| CAS #  | Pollutant    | Uncontrolled Emission Factors g/Bhp-hr | Controlled Emission Factors g/Bhp-hr | Source   |
|--------|--------------|--|--------------------------------------|----------|
|        | VOC          | 1.5                                    | 0.30                                 | Operator |
|        | NOx          | 0.50                                   | 0.50                                 | Operator |
|        | CO           | 2.72                                   | 0.15                                 | Operator |
| 50000  | Formaldehyde | 0.20                                   | 0.02                                 | Operator |
| 75070  | Acetaldehyde | 0.00836                                | 0.00836                              | Operator |
| 107028 | Acrolein     | 0.00514                                | 0.00514                              | Operator |
| 67561  | Methanol     | 0.0025                                 | 0.0025                               | Operator |

**Point 010:**

| CAS #  | Pollutant    | Uncontrolled Emission Factors g/Bhp-hr | Controlled Emission Factors g/Bhp-hr | Source   |
|--------|--------------|--|--------------------------------------|----------|
|        | VOC          | 0.91                                   | 0.36                                 | Operator |
|        | NOx          | 0.5                                    | 0.5                                  | Operator |
|        | CO           | 2.43                                   | 0.2                                  | Operator |
| 50000  | Formaldehyde | 0.43                                   | 0.035                                | Operator |
| 75070  | Acetaldehyde | 0.00836                                | 0.00836                              | Operator |
| 107028 | Acrolein     | 0.00514                                | 0.00514                              | Operator |
| 67561  | Methanol     | 0.0025                                 | 0.0025                               | Operator |

- 6) In accordance with C.R.S. 25-7-114.1, each Air Pollutant Emission Notice (APEN) associated with this permit is valid for a term of five years from the date it was received by the Division. A revised APEN shall be submitted no later than 30 days before the five-year term expires. Please refer to the most recent annual fee invoice to determine the APEN expiration date for each emissions point associated with this permit. For any questions regarding a specific expiration date call the Division at (303)-692-3150.
- 7) This engine is subject to 40 CFR, Part 60, **Subpart JJJJ—Standards of Performance for Stationary Spark Ignition Internal Combustion Engines** (See January 18, 2008 Federal Register posting – effective March 18, 2008). This rule has not yet been incorporated into Colorado Air Quality Control Commission's Regulation No. 6. A copy of the complete subpart is available on the EPA website at: <http://www.epa.gov/ttn/atw/area/fr18ja08.pdf>
- 8) This engine is subject to 40 CFR, Part 63, Subpart ZZZZ - **National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines**. (See January 18, 2008 Federal Register posting - effective March 18, 2008). The January 18, 2008 amendments to include requirements for area sources and engines  $\leq 500$  hp located at major sources have not yet been incorporated into Colorado Air Quality Control Commission's Regulation No. 8. A copy of the complete

subpart is available on the EPA website at: <http://www.epa.gov/ttn/atw/area/fr18ja08.pdf> Additional information regarding area source standards can be found on the EPA website at: <http://www.epa.gov/ttn/atw/area/arearules.html>

- 9) This engine is subject to 40 CFR, Part 63, Subpart ZZZZ - **National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines** (See August 20, 2010 Federal Register posting - effective October 19, 2010). The August 20, 2010 amendments to include requirements for existing engines located at area sources and existing engines  $\leq 500$  hp located at major sources have not yet been incorporated into Colorado Air Quality Control Commission's Regulation No. 8. A copy of the complete subpart is available on the EPA website at: <http://www.epa.gov/ttn/atw/rice/fr20au10.pdf> Additional information regarding area source standards can be found on the EPA website at: <http://www.epa.gov/ttn/atw/area/arearules.html>
- 10) This permit fulfills the requirement to hold a valid permit reflecting the glycol dehydration unit and associated control device per the Colorado Oil and Gas Conservation Commission rule 805b(2)(B) when applicable.
- 11) This facility is classified as follows:

| Applicable Requirement | Status                               |
|------------------------|--------------------------------------|
| Operating Permit       | Synthetic Minor Source of: VOC, HAPs |
| NANSR                  | Synthetic Minor Source of: VOC, HAPs |
| MACT HH                | Area Source Requirements: Applicable |
| NSPS OOOOa             | Applicable                           |
| MACT ZZZZ              | Area Source Requirements: Applicable |

- 12) Full text of the Title 40, Protection of Environment Electronic Code of Federal Regulations can be found at the website listed below:

<http://ecfr.gpoaccess.gov/>

| Part 60: Standards of Performance for New Stationary Sources                            |                     |                                |
|---|---------------------|--------------------------------|
| NSPS  | 60.1-End            | Subpart A – Subpart KKKK       |
| NSPS  | Part 60, Appendixes | Appendix A – Appendix I        |
| Part 63: National Emission Standards for Hazardous Air Pollutants for Source Categories |                     |                                |
| MACT  | 63.1-63.599         | Subpart A – Subpart Z          |
| MACT  | 63.600-63.1199      | Subpart AA – Subpart DDD       |
| MACT  | 63.1200-63.1439     | Subpart EEE – Subpart PPP      |
| MACT  | 63.1440-63.6175     | Subpart QQQ – Subpart YYYYY    |
| MACT  | 63.6580-63.8830     | Subpart ZZZZ – Subpart MMMMM   |
| MACT  | 63.8980-End         | Subpart NNNNN – Subpart XXXXXX |

## Appendix C

Location --  
 Source --  
 Project No. --  
 Run No. --  
 Method --

Meter Pressure (Pm), in. Hg

$$P_m = P_b + \frac{\Delta H}{13.6}$$

where,

Pb -- = barometric pressure, in. Hg  
 ΔH 0.000 = pressure differential of orifice, in H<sub>2</sub>O  
 Pm -- = in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$P_s = P_b + \frac{P_g}{13.6}$$

where,

Pb -- = barometric pressure, in. Hg  
 Pg -- = static pressure, in. H<sub>2</sub>O  
 Ps -- = in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \times Y \times V_m \times P_m}{T_m}$$

where,

Y 0.000 = meter correction factor  
 Vm -- = meter volume, cf  
 Pm -- = absolute meter pressure, in. Hg  
 Tm -- = absolute meter temperature, °R  
 Vmstd -- = dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707 \times Vlc$$

where,

Vlc -- = volume of H<sub>2</sub>O collected, ml  
 Vwstd -- = scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWS_{sat} = \frac{10^{6.37 \left( \frac{2.827}{T_s + 365} \right)}}{P_s}$$

where,

Ts -- = stack temperature, °F  
 Ps -- = absolute stack gas pressure, in. Hg  
 BWSsat -- = dimensionless

Moisture Fraction (BWSmsd), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd -- = standard wet volume, scf  
 Vmstd -- = standard meter volume, dscf  
 BWS -- = dimensionless

Location --  
 Source --  
 Project No. --  
 Run No. --  
 Method --

## Moisture Fraction (BWS), dimensionless

$$BWS = BWS_{msd} \text{ unless } BWS_{sat} < BWS_{msd}$$

where,

BWS<sub>sat</sub> -- = moisture fraction (theoretical at saturated conditions)  
 BWS<sub>msd</sub> -- = moisture fraction (measured)  
 BWS -- = dimensionless

## Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 (100 - \% CO_2 - \% O_2))$$

where,

CO<sub>2</sub> -- = carbon dioxide concentration, %  
 O<sub>2</sub> -- = oxygen concentration, %  
 Md -- = lb/lb mol

## Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md (1 - BWS) + 18 (BWS)$$

where,

Md -- = molecular weight (DRY), lb/lb mol  
 BWS -- = moisture fraction, dimensionless  
 Ms -- = lb/lb mol

## Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp -- = pitot tube coefficient  
 Δ P<sup>1/2</sup> -- = velocity head of stack gas, (in. H<sub>2</sub>O)<sup>1/2</sup>  
 Ts -- = absolute stack temperature, °R  
 Ps -- = absolute stack gas pressure, in. Hg  
 Ms -- = molecular weight of stack gas, lb/lb mol  
 Vs -- = ft/sec

## Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs -- = stack gas velocity, ft/sec  
 As -- = cross-sectional area of stack, ft<sup>2</sup>  
 Qa -- = acfm

## Average Stack Gas Flow at Standard Conditions (Qsw), scfm

$$Qsw = 17.647 \times Qa \times \frac{Ps}{Ts}$$

where,

Qa -- = average stack gas flow at stack conditions, acfm  
 Ps -- = absolute stack gas pressure, in. Hg  
 Ts -- = absolute stack temperature, °R  
 Qsw -- = scfm

Location --  
 Source --  
 Project No. --  
 Run No. --  
 Method --

## Average Stack Gas Flow at Standard Conditions (Qsw), scfh

$$Q_{sw} = 17.647 \times Q_a \times 60 \times \frac{P_s}{T_s}$$

where,

Qa -- = average stack gas flow at stack conditions, acfm  
 Ps -- = absolute stack gas pressure, in. Hg  
 Ts -- = absolute stack temperature, °R  
 Qsw -- = scfh

## Average Stack Gas Flow at Standard Conditions (Qsd), dscfm

$$Q_{sd} = 17.647 \times Q_a \times (1 - BWS) \times \frac{P_s}{T_s}$$

where,

Qa -- = average stack gas flow at stack conditions, acfm  
 BWS -- = moisture fraction  
 Ps -- = absolute stack gas pressure, in. Hg  
 Ts -- = absolute stack temperature, °R  
 Qsd -- = dscfm

## Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Y_{qa} = \frac{\left( \frac{\Theta}{V_m} \sqrt{\frac{0.0319 \times T_m \times 29}{\Delta H @ \times \left( P_b + \frac{\Delta H_{avg}}{13.6} \right) \times M_d}} \sqrt{\Delta H_{avg}} \right)}{Y} \times 100$$

where,

Y 0 = meter correction factor, dimensionless  
 Θ 0 = run time, min.  
 Vm -- = total meter volume, dcf  
 Tm -- = absolute meter temperature, °R  
 ΔH@ 0 = orifice meter calibration coefficient, in. H<sub>2</sub>O  
 Pb -- = barometric pressure, in. Hg  
 ΔH avg 0.000 = average pressure differential of orifice, in H<sub>2</sub>O  
 Md -- = molecular weight (DRY), lb/lb mol  
 (Δ H)<sup>1/2</sup> 0.000 = average squareroot pressure differential of orifice, (in. H<sub>2</sub>O)<sup>1/2</sup>  
 Yqa -- = dimensionless

Location: --  
Source: --  
Project No.: --  
Run No. /Method Run 1 - Method

**Target 1 - Outlet Concentration, ppmvd**

$$C_{Tid} = \frac{C_{T1w}}{1 - BWS}$$

where,

CT1w -- = T1 concentration, ppmvw  
BWS -- = moisture fraction, unitless  
CT1d -- = ppmvd

**Target 1 - Outlet Concentration, ppmvd @ 15% O<sub>2</sub>**

$$C_{T1c} = C_{T1} \times \frac{20.9 - C_{O2c}}{20.9 - C_{O2}}$$

where,

CT1 -- = T1 concentration, ppmvd  
C<sub>O2c</sub> 15.0 = Desired O<sub>2</sub> correction concentration, %  
C<sub>O2</sub> -- = O<sub>2</sub> concentration, %  
CT1c3 -- = ppmvd @ 3% O<sub>2</sub>

**Target 1 - Outlet Emission Rate, lb/hr**

$$ER_{T1} = \frac{C_{T1} \times MW \times Q_s \times 60 \times 28.32}{24.04 \times 1.0E + 06 \times 454}$$

where,

CT1 -- = T1 concentration, ppmvd  
MW 56.0 = molecular weight, g/g-mole  
Q<sub>s</sub> -- = stack gas volumetric flow rate at standard conditions, dscfm  
ER T1 -- = lb/hr

**Target 1 - Outlet Emission Factor (EF<sub>T1</sub>), g/hp-hr**

$$EF_{T1} = \frac{ER_{T1} \times 454}{EBW}$$

where,

ER<sub>T1</sub> -- = T1 emission rate, lb/hr  
EBW -- = engine brake work, HP  
EF<sub>T1</sub> -- = g/HP-hr

## Appendix D

Location: \_\_\_\_\_  
 Source: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 Date: \_\_\_\_\_

| Parmeter   | O <sub>2</sub> | CO <sub>2</sub> | SO <sub>2</sub> | NO <sub>x</sub> | CO  | TRS | THC |
|--|----------------|-----------------|-----------------|-----------------|-----|-----|-----|
| Expected Average Concentration                           |                |                 |                 |                 |     |     |     |
| Span Should be between:                                  |                |                 |                 |                 |     |     |     |
| Low  | -              | -               | -               | -               | -   | -   | -   |
| High   | -              | -               | -               | -               | -   | -   | -   |
| Desired Span   |                |                 |                 |                 |     |     |     |
| Low Range Gas Should be between:                         |                |                 |                 |                 |     |     |     |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  | -   |
| High   | NA             | NA              | NA              | NA              | NA  | NA  | -   |
| Mid Range Gas Should be between:                         |                |                 |                 |                 |     |     |     |
| Low  | -              | -               | -               | -               | -   | -   | -   |
| High   | -              | -               | -               | -               | -   | -   | -   |
| High Range Gas Should be between:                        |                |                 |                 |                 |     |     |     |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  | -   |
| High   | NA             | NA              | NA              | NA              | NA  | NA  | -   |
| Actual Concentration (% or ppm)                          |                |                 |                 |                 |     |     |     |
| Zero   | 0.0            | 0.0             | 0.0             | 0.0             | 0.0 | 0.0 | 0.0 |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  |     |
| Mid  |                |                 |                 |                 |     |     |     |
| High   | -              | -               | -               | -               | -   | -   |     |
| Cylinder Certification Numbers                           |                |                 |                 |                 |     |     |     |
| Zero   | NA             | NA              | NA              | NA              | NA  | NA  | NA  |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  |     |
| Mid  |                |                 |                 |                 |     |     |     |
| High   |                |                 |                 |                 |     |     |     |
| Response Time (seconds)                                  |                |                 |                 |                 |     |     |     |
| Instrument Response (% or ppm)                           |                |                 |                 |                 |     |     |     |
| Zero   |                |                 |                 |                 |     |     |     |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  |     |
| Mid  |                |                 |                 |                 |     |     |     |
| High   |                |                 |                 |                 |     |     |     |
| Performance (% of Span or Calibration Gas Concentration) |                |                 |                 |                 |     |     |     |
| Zero   | -              | -               | -               | -               | -   | -   | -   |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  | -   |
| Mid  | -              | -               | -               | -               | -   | -   | -   |
| High   | -              | -               | -               | -               | -   | -   | -   |
| Status   |                |                 |                 |                 |     |     |     |
| Zero   | -              | -               | -               | -               | -   | -   | -   |
| Low  | NA             | NA              | NA              | NA              | NA  | NA  | -   |
| Mid  | -              | -               | -               | -               | -   | -   | -   |
| High   | -              | -               | -               | -               | -   | -   | -   |

Notes:

Location: - \_\_\_\_\_  
Source: - \_\_\_\_\_  
Project No.: - \_\_\_\_\_

| Parameter                     | O <sub>2</sub> | CO <sub>2</sub> | SO <sub>2</sub> | NO <sub>x</sub> | CO | TRS | THC |
|-------------------------------|----------------|-----------------|-----------------|-----------------|----|-----|-----|
| <b>Run 1</b> <b>Date</b> --   |                |                 |                 |                 |    |     |     |
| Span Value                    | -              | -               | -               | -               | -  | -   | -   |
| Instrument Zero Cal Response  | -              | -               | -               | -               | -  | -   | -   |
| Instrument Mid Cal Response   | -              | -               | -               | -               | -  | -   | -   |
| Pretest System Zero Response  | -              | -               | -               | -               | -  | -   | -   |
| Posttest System Zero Response | -              | -               | -               | -               | -  | -   | -   |
| Pretest System Mid Response   | -              | -               | -               | -               | -  | -   | -   |
| Posttest System Mid Response  | -              | -               | -               | -               | -  | -   | -   |
| Bias (%)                      |                |                 |                 |                 |    |     |     |
| Pretest Zero                  | -              | -               | -               | -               | -  | -   | NA  |
| Posttest Zero                 | -              | -               | -               | -               | -  | -   | NA  |
| Pretest Span                  | -              | -               | -               | -               | -  | -   | NA  |
| Posttest Span                 | -              | -               | -               | -               | -  | -   | NA  |
| Drift (%)                     |                |                 |                 |                 |    |     |     |
| Zero                          | -              | -               | -               | -               | -  | -   | -   |
| Mid                           | -              | -               | -               | -               | -  | -   | -   |
| <b>Run 2</b> <b>Date</b> --   |                |                 |                 |                 |    |     |     |
| Span Value                    | -              | -               | -               | -               | -  | -   | -   |
| Instrument Zero Cal Response  | -              | -               | -               | -               | -  | -   | -   |
| Instrument Mid Cal Response   | -              | -               | -               | -               | -  | -   | -   |
| Pretest System Zero Response  | -              | -               | -               | -               | -  | -   | -   |
| Posttest System Zero Response | -              | -               | -               | -               | -  | -   | -   |
| Pretest System Mid Response   | -              | -               | -               | -               | -  | -   | -   |
| Posttest System Mid Response  | -              | -               | -               | -               | -  | -   | -   |
| Bias (%)                      |                |                 |                 |                 |    |     |     |
| Pretest Zero                  | -              | -               | -               | -               | -  | -   | NA  |
| Posttest Zero                 | -              | -               | -               | -               | -  | -   | NA  |
| Pretest Span                  | -              | -               | -               | -               | -  | -   | NA  |
| Posttest Span                 | -              | -               | -               | -               | -  | -   | NA  |
| Drift (%)                     |                |                 |                 |                 |    |     |     |
| Zero                          | -              | -               | -               | -               | -  | -   | -   |
| Mid                           | -              | -               | -               | -               | -  | -   | -   |
| <b>Run 3</b> <b>Date</b> --   |                |                 |                 |                 |    |     |     |
| Span Value                    | -              | -               | -               | -               | -  | -   | -   |
| Instrument Zero Cal Response  | -              | -               | -               | -               | -  | -   | -   |
| Instrument Mid Cal Response   | -              | -               | -               | -               | -  | -   | -   |
| Pretest System Zero Response  | -              | -               | -               | -               | -  | -   | -   |
| Posttest System Zero Response | -              | -               | -               | -               | -  | -   | -   |
| Pretest System Mid Response   | -              | -               | -               | -               | -  | -   | -   |
| Posttest System Mid Response  | -              | -               | -               | -               | -  | -   | -   |
| Bias (%)                      |                |                 |                 |                 |    |     |     |
| Pretest Zero                  | -              | -               | -               | -               | -  | -   | NA  |
| Posttest Zero                 | -              | -               | -               | -               | -  | -   | NA  |
| Pretest Span                  | -              | -               | -               | -               | -  | -   | NA  |
| Posttest Span                 | -              | -               | -               | -               | -  | -   | NA  |
| Drift (%)                     |                |                 |                 |                 |    |     |     |
| Zero                          | -              | -               | -               | -               | -  | -   | -   |
| Mid                           | -              | -               | -               | -               | -  | -   | -   |

Notes:



## Run 1 Data

Location: \_\_\_\_\_  
Source: \_\_\_\_\_  
Project No.: \_\_\_\_\_  
Date: \_\_\_\_\_

| Time | O <sub>3</sub> | CO <sub>2</sub> | SO <sub>2</sub> | NOx  | CO   | TRS  | THC  |
|------|----------------|-----------------|-----------------|------|------|------|------|
| Unit | % dry          | % dry           | ppmv            | ppmv | ppmv | ppmv | ppmv |

| Parameter                             | Diluent |     | Pollutant |     |    |     |     |
|---------------------------------------|---------|-----|-----------|-----|----|-----|-----|
|                                       | O2      | CO2 | SO2       | NOx | CO | TRS | THC |
| Uncorrected Run Average ( $C_{obs}$ ) | -       | -   | -         | -   | -  | -   | -   |
| Cal Gas Concentration ( $C_{MA}$ )    | -       | -   | -         | -   | -  | -   | -   |
| Pretest System Zero Response          |         |     |           |     |    |     |     |
| Posttest System Zero Response         |         |     |           |     |    |     |     |
| Average Zero Response ( $C_0$ )       | -       | -   | -         | -   | -  | -   | -   |
| Pretest System Cal Response           |         |     |           |     |    |     |     |
| Posttest System Cal Response          |         |     |           |     |    |     |     |
| Average Cal Response ( $C_M$ )        | -       | -   | -         | -   | -  | -   | -   |
| Corrected Run Average (Corr)          | -       | -   | -         | -   | -  | -   | NA  |

| Run Number                               |                             |   | Run 1 | Run 2 | Run 3 | Average |
|--|-----------------------------|---|-------|-------|-------|---------|
| Date                                     |                             |   | --    | --    | --    | --      |
| Start Time                               |                             |   | --    | --    | --    | --      |
| Stop Time                                |                             |   |       |       |       | --      |
| Input Data                               |                             |   |       |       |       |         |
| Feed Rate                                | lb/hr                       | FR  |       |       |       | --      |
| Heat Input                               | MMBtu/hr                    | HI  |       |       |       | --      |
| Fuel Heating Value                       | Btu/scf                     | F <sub>HV</sub>                             |       |       |       | --      |
| Fuel Rate                                | scfh                        | F <sub>R</sub>                              |       |       |       | --      |
| Volumetric Flow Rate (M19)               | dscfm                       | Q <sub>S</sub>                              | --    | --    | --    | --      |
| Volumetric Flow Rate (M1-4)              | dscfm                       | Q <sub>S</sub>                              |       |       |       | --      |
| Volumetric Flow Rate                     | dscfm                       | Q <sub>S</sub>                              | --    | --    | --    | --      |
| Methane Concentration                    | ppmvd                       | C <sub>Me</sub>                             | --    | --    | --    | --      |
| Moisture Fraction                        | --                          | BWS   |       |       |       | --      |
| Response Factor                          | --                          | RF  | --    | --    | --    | --      |
| Dilution Factor                          | --                          | DF  | --    | --    | --    | --      |
| Fuel Factor (O <sub>2</sub> dry)         | dscf/MMBtu                  | F <sub>d</sub>                              |       |       |       | --      |
| Fuel Factor (O <sub>2</sub> wet)         | dscf/MMBtu                  | F <sub>w</sub>                              |       |       |       | --      |
| Fuel Factor (CO <sub>2</sub> )           | dscf/MMBtu                  | F <sub>c</sub>                              |       |       |       | --      |
| Values                                   |                             |   |       |       |       |         |
| O <sub>2</sub> Concentration             | % dry                       | C <sub>O<sub>2</sub></sub>                  | --    | --    | --    | --      |
| O <sub>2</sub> Concentration             | % wet                       | C <sub>O<sub>2w</sub></sub>                 | --    | --    | --    | --      |
| CO <sub>2</sub> Concentration            | % dry                       | C <sub>CO<sub>2</sub></sub>                 | --    | --    | --    | --      |
| CO <sub>2</sub> Concentration            | % wet                       | C <sub>CO<sub>2w</sub></sub>                | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Rate            | lb/hr                       | ER <sub>CO<sub>2</sub>PPH</sub>             | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Rate            | metric ton/hr               | ER <sub>CO<sub>2</sub>MPH</sub>             | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Rate            | metric ton/yr               | ER <sub>CO<sub>2</sub>MPY</sub>             | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Factor          | lb/MMBtu                    | EF <sub>CO<sub>2</sub>O<sub>2d</sub></sub>  | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Factor          | lb/MMBtu                    | EF <sub>CO<sub>2</sub>O<sub>2w</sub></sub>  | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Factor          | lb/MMBtu                    | EF <sub>CO<sub>2</sub>CO<sub>2d</sub></sub> | --    | --    | --    | --      |
| CO <sub>2</sub> Emission Factor          | lb/MMBtu                    | EF <sub>CO<sub>2</sub>CO<sub>2w</sub></sub> | --    | --    | --    | --      |
| THC (as C <sub>3</sub> ) Concentration   | ppmvd                       | C <sub>THCd</sub>                           | --    | --    | --    | --      |
| THC (as C <sub>3</sub> ) Concentration   | ppmvw                       | C <sub>THCw</sub>                           | --    | --    | --    | --      |
| THC (as C <sub>3</sub> ) Concentration   | ppmvd                       | C <sub>THC</sub>                            | --    | --    | --    | --      |
| THC (as C <sub>3</sub> ) Concentration   | ppmvd                       | C <sub>THC</sub>                            | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Concentration   | ppmvd                       | C <sub>VOC</sub>                            | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Concentration   | ppmvd @ 3 % O <sub>2</sub>  | C <sub>VOCe3</sub>                          | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Concentration   | ppmvd @ 7 % O <sub>2</sub>  | C <sub>VOCe7</sub>                          | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Concentration   | ppmvd @ 8 % O <sub>2</sub>  | C <sub>VOCe8</sub>                          | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Concentration   | ppmvd @ 10 % O <sub>2</sub> | C <sub>VOCe10</sub>                         | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Concentration   | ppmvd @ 15 % O <sub>2</sub> | C <sub>VOCe15</sub>                         | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Rate   | lb/hr                       | ER <sub>VOC</sub>                           | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Factor | lb/ton                      | EF <sub>VOCPPPT</sub>                       | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Rate   | ton/hr                      | ER <sub>VOCPTH</sub>                        | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Rate   | ton/day                     | ER <sub>VOCPTD</sub>                        | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Rate   | ton/yr                      | ER <sub>VOCPTY</sub>                        | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Factor | lb/MMBtu                    | EF <sub>VOCCHI</sub>                        | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Factor | lb/MMBtu                    | EF <sub>VOCO<sub>2d</sub></sub>             | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Factor | lb/MMBtu                    | EF <sub>VOCO<sub>2w</sub></sub>             | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Factor | lb/MMBtu                    | EF <sub>VOCCO<sub>2d</sub></sub>            | --    | --    | --    | --      |
| VOC (as C <sub>3</sub> ) Emission Factor | lb/MMBtu                    | EF <sub>VOCCO<sub>2w</sub></sub>            | --    | --    | --    | --      |
| VOC (as____) Concentration               | ppmvd                       | C <sub>VOC***</sub>                         | --    | --    | --    | --      |
| VOC (as____) Emission Rate               | lb/hr                       | ER <sub>VOC***</sub>                        | --    | --    | --    | --      |

Date: \_\_\_\_\_

Analyzer Type: -- \_\_\_\_\_

Envionics ID: -- \_\_\_\_\_

Component/Balance Gas (Dilution): -- \_\_\_\_\_

Cylinder Gas No (Dilution): \_\_\_\_\_

Cylinder Gas Concentration (Dilution): \_\_\_\_\_

Component/Balance Gas (Mid-Level): -- \_\_\_\_\_

Cylinder Gas No (Mid-Level): \_\_\_\_\_

Cylinder Gas Concentration (Mid-Level): \_\_\_\_\_

| Gas Divider Setting (%) | Predicted Concentration (ppm) | Calibration 1 Analyzer Concentration (ppm) | Calibration 2 Analyzer Concentration (ppm) | Calibration 3 Analyzer Concentration (ppm) | Average Analyzer Concentration (ppm) | Difference (ppm) | Average Error <sup>1</sup> (%) |
|-------------------------|-------------------------------|--|--|--|--------------------------------------|------------------|--------------------------------|
| 50.0                    | -                             |  |  |  | -                                    | -                | -                              |
| 30.0                    | -                             |  |  |  | -                                    | -                | -                              |
| 10.0                    | -                             |  |  |  | -                                    | -                | -                              |

<sup>1</sup> Method 205 §3.2.5 - For each level of dilution, calculate the difference between the average concentration output recorded by the analyzer and the predicted concentration. The average concentration output from the analyzer shall be within  $\pm 2\%$  of the predicted concentration.

| Average Analyzer Concentration (ppm) | Calibration 1 Error <sup>2</sup> (%) | Calibration 2 Error <sup>2</sup> (%) | Calibration 3 Error <sup>2</sup> (%) |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| -                                    | -                                    | -                                    | -                                    |
| -                                    | -                                    | -                                    | -                                    |
| -                                    | -                                    | -                                    | -                                    |

<sup>2</sup> Method 205 §3.2.4 - Calculate the average instrument response for each triplicate injection at each dilution level. No single injection shall differ by more than  $\pm 2\%$  from the average instrument response for that dilution.

### Mid-Level Supply Gas Calibration Direct to Analyzer

| Calibration Gas Concentration (ppm) | Calibration 1 Analyzer Concentration (ppm) | Calibration 2 Analyzer Concentration (ppm) | Calibration 3 Analyzer Concentration (ppm) | Average Analyzer Concentration (ppm) | Difference (ppm) | Average Error <sup>3</sup> (%) |
|-------------------------------------|--|--|--|--------------------------------------|------------------|--------------------------------|
| 0.00                                |  |  |  | -                                    | -                | -                              |

<sup>3</sup> Method 205 §3.2.6 - Calculate the average analyzer output concentration for the mid-level supply gas. The difference between the certified concentration of the mid-level supply gas and the instrument response shall be within  $\pm 2\%$ .

### PROCEDURE:

Connect the dilution and high-level calibration gas to the Envionics gas divider. Flow the mixed gases according to the ratios provided in the above table. Repeat the procedure for three trials. An additional mid-level calibration gas, within 10% of one of the predicted concentrations, should be fed directly into the analyzer bypassing the gas divider. Repeat the procedure for three trials.

# Stratification Check

Date:  
Time:

| Traverse Point           | NOx<br>(ppm) | Abs. Standard<br>Deviation | CO<br>(ppm) | Abs. Standard<br>Deviation | SO2<br>(ppm) | Abs. Standard<br>Deviation | CO <sub>2</sub><br>(ppm) | Abs. Standard<br>Deviation | O <sub>2</sub><br>(%) | Abs. Standard<br>Deviation |
|--------------------------|--------------|----------------------------|-------------|----------------------------|--------------|----------------------------|--------------------------|----------------------------|-----------------------|----------------------------|
| A-1                      |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 2                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 3                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 4                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 5                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 6                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| B-1                      |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 2                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 3                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 4                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 5                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| 6                        |              | ---                        |             | ---                        |              | ---                        |                          | ---                        |                       | ---                        |
| Average                  | ---          | ---                        | ---         | ---                        | ---          | ---                        | ---                      | ---                        | ---                   | ---                        |
| Allowable <sup>1,2</sup> | ---          | ---                        | ---         | ---                        | ---          | ---                        | ---                      | ---                        | ---                   | ---                        |
| Status                   | PASS         | PASS                       | PASS        | PASS                       | PASS         | PASS                       | PASS                     | PASS                       | PASS                  | PASS                       |

<sup>1</sup> Single Point - 5% from the average or +/- 0.5 ppm for pollutant and +/- 0.3% for diluent.

<sup>2</sup> Three Points - 10% from the average or +/- 1.0 ppm for pollutant and +/- 0.5% for diluent.

Notes: